REMARKS

Claims 1-33 are pending in the application. Claims 1-23 and 25-33 stand rejected. Claim 24 stands objected to. Claims 1, 19-21, 23-26, 28, and 30 were amended. Claims 1-33 remain in the application.

Claim 24 was objected to as being dependent upon a rejected base claim, but allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claim 24 was so amended.

Claims 1, 26, and 28 stand rejected under the judicially created doctrine of double patenting over Claim 6 of U.S. Patent No. 6,891,977. Claims 1, 26, and 28 have been amended and now incorporated language having some similarity to Claim 30. In view of that, it is expected that this rejection will be withdrawn.

Claim 25 stands rejected under 35 U.S.C. 101 as being directed to non-statutory subject matter. Claim 25 was amended as suggested.

Claims 1, 3, 10-14, 19-21, 23, 25-30 and 33 stand rejected under 35 U.S.C. 102(e) as being anticipated – by Qian (US Patent 6,707,940 B1). The rejection stated:

> 'Regarding claim 1, Qian discloses a method for processing a digital image (fig. 4, label: original image), comprising the steps of:
>
> 'a) providing a subject matter detector (Fig. 4, num. 300: image segmenter is a provided subject matter detector that detects via a "classification" in col. 4, line 34 an "object" in col. 4, line 26 as subject matter.) for distinguishing between target and background subject matters (Fig. 4, num. 300: image segmenter is a provided subject matter detector that detects via a "classification" in col. 4, line 34 and "object" in col. 4, line 26 as subject matter and for distinguishing between target or "object pixels" in col. 4, line 29 and background subject matters or "background pixels" in col. 4, line 29.);
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> 'b) applying the subject matter detector (Fig. 4, num. 300: image segmenter is applied via an input arrow.) to the image (Fig. 4, num. 300: image segmenter is applied via an input arrow to the original image as shown in fig. 4.) to produce a belief map (Fig. 4, num. 300: image

segmenter is applied via an input arrow to the original image as shown in fig. 4 to produce a belief map or "segmentation map" as shown in fig.4.) of values (Fig. 4, num. 300: image segmenter is applied via an input arrow to the original image as shown in fig. 4 to produce a belief map or "segmentation map" in col. 4, line 27 and shown in fig. 4 of values or "pixels of value" in col. 4, line 28.) indicating the degree of belief (Fig. 4, num. 300: image segmenter is applied via an input arrow to the original image as shown in fig. 4 to produce a belief map or segmentation map" in col. 4, line 27 and shown in fig. 4 of values or "pixels of value" in col. 4, line 28 indicating the degree of belief or "probability" in col. 4, line 35.)...that pixels in the image (Fig. 4, num. 300: image segmenter is applied via an input arrow to the original image as shown in fig. 4 to produce a belief map or "segmentation map" in col. 4, line 27 and shown in fig. 4 of values or "pixels of value" in col. 4, line 28 indicating the degree of belief or "probability" in col. 4, line 35 that "object pixels" in col. 4, line 29 in the original image.) belong to target subject matter (fig. 4, num. 300: image segmenter is applied via an input arrow to the original image as shown in fig. 4 to produce a belief map or "segmentation map" in col. 4, line 27 and shown in fig. 4 of values or "pixels of value" in col. 4, line 28 indicating the degree of belief or "probability" in col. 3, line 35 · that "object pixels" in col. 4, line 29 in the original image belong or "correspond" in col. 4, line 29 to target subject matter or "predetermined object" in col. 4, line 26.);

'c) providing an image enhancement operation (Fig. 4, num. 400: image smoother is a provided image enhancement operation.) that is responsive to a control signal (Fig. 4, num. 400: image smoother is a provided image enhancement operation that is responsive to a control signal as shown in fig.3, diamond label: "x=X?".) for controlling the degree of image enhancement (Fig. 4, num. 400: image smoother is a provided image enhancement operation that is responsive to a control signal as shown in fig. 3, diamond label: "x=X?" for controlling the "degree of [image enhancement or] smoothing" in col. 3, line 60 via "iterations" in col. 3, line 59 using the control signal as shown in fig. 3,

diamond label: "x=X?" where X determines the number of iterations.); and

'd) applying image enhancement operation (Fig. 4, num. 400: image smoother is applied via an input arrow.) to the digital image (Fig. 4, num. 400: image smoother is applied via an input arrow to the digital image or original image as shown in fig. 4 via a segmentation map of fig. 4. Note that the segmentation map contains a "version of an image" in col. 4, line 23 or a version of the original image.) by varying the control signal (Fig. 4, num. 400: image smoother is applied via an input arrow to the digital image or original image as shown in fig. 4 via a segmentation map of fig. 4 by varying the control signal using the diamond of fig. 3, label: "x=X?" where x has a variable "range of x"in col. 3, line 42.) pixel by pixel (Fig. 4, num. 400: image smoother is applied via an input arrow to the digital image or original image as shown in fig. 4 via a segmentation map of fig. 4 by varying the control signal using the diamond of fig. 3, label: "x=X?" where x has a variable "range of x" in col. 3, line 42 where x corresponds to "pixel by pixel operation" in col. 4, line 21.) according to the belief map (Fig. 4, num. 400: image smoother is applied via an input arrow to the digital image or original image as shown in fig. 4 via a segmentation map of fig.4 by varying the control signal using the diamond of fig.3, label: "x=X?" where x has a variable "range of x" in col. 3, line 42 where x corresponds to a "pixel by pixel operation" in col. 4, line 21 according to the belief map or segmentation map.) to produce an enhanced image.'

Claim 1 states:

1. A method for processing a digital image, comprising the steps of:

providing a subject matter detector for distinguishing between target and background subject matters;

applying the subject matter detector to the digital image to produce a belief map of values indicating the degree of belief that pixels in the image belong to target subject matter;

analyzing said belief map to provide an analysis result; and

enhancing said digital image, said enhancing varying pixel by pixel responsive to both said belief map and said analysis result.

Changes in Claim 1 are supported by the application as filed, notably the original claims and at page 16, lines 1-23. The word "for" has been deleted from Claim 1 as being unnecessary.

Claim 1 requires:

"enhancing said digital image, said enhancing varying in degree pixel by pixel responsive to both said belief map and said analysis result."

The rejection states that Qian teaches:

'controlling the "degree of [image enhancement or] smoothing" in col. 3, line 60 via "iterations" in col. 3, line 59 using the control signal as shown in fig. 3, diamond label: "x=X?" where X determines the number of iterations.' (office action, page 9)

In Qian, X is a number equal to the number of columns in the image minus one. Qian states:

"As shown in FIG. 3, apparatus 100 may be used to process each among all (or substantially all) of the pixels of an input image as a center pixel. In this example, the range of x in the input image is from 1 to X+1, the range of y is from 1 to Y+1, and the border pixels are not processed." (Qian, col. 3, lines 40-45)

Iterations over the number of columns in the image minus one would not provide a degree of enhancing that varies pixel by pixel.

The rejection's use of "iterations" also conflicts with Qian. The term "iterations" in Qian, col. 3, line 59 is shortened from "iterations across the image". Qian states:

"an image smoother incorporating apparatus 100 may require fewer <u>iterations across the image</u> to perform a comparable degree of smoothing." (Qian, col. 3, lines 58-60; <u>emphasis added</u>)

The loops through "x=X?" in Qian Figure 3, are not "across the image". Each loop operates on a single pixel. See the rectangular box, in Qian Figure 3, labelled "x=x+1". The inner loop in Figure 3 advances one column at a time along the x-axis of the image. At the end of a row, that is, when x=X, the outer loop advances to the next row using the box labelled "y=y+1".

The language "across the image" is also incompatible with the definition of "X" in Qian. If the definition of "X" is substituted for "iterations", in Qian, col. 3, lines 58-60, the result is incomprehensible:

> "an image smoother incorporating apparatus 100 may require fewer [number of columns in the image minus one] across the image to perform a comparable degree of smoothing."

A better interpretation of Qian, col. 3, lines 58-60 is that each "iteration across the image" repeats smoothing of the entire image and the degree of smoothing varies depending upon the number of iterations. This is unlike the claimed invention, in which the enhancing varies in degree pixel by pixel.

Claim 1 also requires:

> "enhancing said digital image" (emphasis added).

In Claim 1, the subject matter detector is applied to a digital image and the image enhancement operation is applied to the same digital image. In Qian Figure 4, the image smoother 400 operates on a segmentation map derived from both an original image and a background image. (See Qian Figure 4, the two inputs into "image segmenter 300" are: "original image" and "background image".) The segmentation map is not the same image as the original image. The rejection states:

> 'Note that the segmentation map contains a "version of an image" in col. 4, line 23 or a version of the original image.' (Office action, page 10);

This fails to acknowledge the role of both the original and background images in the segmentation map of Qian Figure 4:

> "In one form, a segmentation map is a version of an image wherein the value of a pixel represents a likelihood that a corresponding pixel in the original image belongs to a predetermined object, set of objects, area, etc. (e.g. the foreground). For example, a sementation map may be a binary version of an image wherein pixels of value 0 correspond to object pixels in the original image and pixels of value 1 correspond to background pixels.
>
> "In this example, image segmenter 300 receives an original image and a prerecorded image of the background which appears in the original image. The value of the resulting segmentation map at each pixel position is a classification probability (e.g. in the range of from 0 to 255)

that is calculated as a function (as shown in FIG. 5 and discussed below) of the values of the corresponding pixels in these two images." (Qian, col. 4, lines 23-38; emphasis added)

In Qian, the segmentation map is a version of two different images. This is analogous to saying that a child is a small version of his or her parents. It would not be argued that the child is the same person as either of the parents. Likewise, the segmentation map of Qian is not the same image as either the "original image" or the "background image".

Claim 1 also requires analyzing the belief map to provide an analysis result and enhancing that varies pixel by pixel responsive to both the belief map and the analysis result. Original Claim 23 stated:

> 23. The method claimed in claim 1, further comprising the step of analyzing the belief map to generate the control signal.

The Office Action stated in relation to original Claim 23:

> 'Regarding claim 23, Qian discloses the method claimed in claim 1, further comprising:
>
> 'a) the step of analyzing (Fig. 3, label: input values...to filter 100 is a step of analyzing or "con-siders" in col. 3, lines 55,56.) the belief map (Fig. 3, label: input values...to filter 100 is a step of analyzing or "con-siders" in col. 3, lines 55,56 the belief map or segmentation map as shown in fig. 3 as a 3X3 array of squares.) to generate the control signal (Fig. 3, label: input values...to filter 100 is a step of analyzing or "considers in col. 3, lines 55,56 the belief map or segmentation map as shown in fig. 3 as a 3X3 array of squares to generate the control signal in a succeeding step shown in fig. 3 as a diamond label, "x=X?".).'

Qian states:

> "For example, apparatus 100 considers more of a center pixel's neighborhood, and more directions within that neighborhood, in calculating the new center pixel value." (Qian, col. 3, lines 55-58; also see col. 2, line 22 to col. 3, line 29; emphasis added)

The output of apparatus 100 is smoothed pixels "q(x,y)", which together are the smoothed segmentation map. (See Figure 1--note dashed line indicating apparatus 100) The smoothed segmentation map in Qian is not used to control the smoothing operation. (See Qian, Figures 1, 3, and 4) Claim 1, in contrast to

Qian, requires that enhancing varies pixel by pixel responsive to both the belief map and the analysis result.

Claims 3, 10-14, 19-21, 23, and 25 are allowable as depending from Claim 1 and as follows.

The rejection stated in relation to Claims 19-20:

'Regarding claim 19, Qian discloses the method claimed in claim 1, wherein the control signal (The control signal as shown in fig. 3, diamond label: "x=X?") is varied (The control signal as shown in fig.3, diamond label: "x=X?" is varied where x has a variable "range of x" in col. 3, line 42.) in accordance to the belief map (The control signal as shown in fig.3, diamond label: "x=X?" is varied where x has a variable "range of x" in col. 3, line 42 in accordance to the belief map or segementation map which is represented as a 3x3 array that is inputted into filter 100 as shown in fig. 1 and fig. 3, label: "filter 100".) and to a signal related to the sizes of regions (The control signal as shown in fig. 3, diamond label: "x=X?" is varied where x has a variable "range of x" in col. 3, line 42 in accordance to the belief map or segmentation map which is represented as a 3X3 array that is inputted into filter 100 as shown in fig. 1 and fig. 3, label: "filter 100" and to a signal "p(x+u,y+v)" as shown in fig.3 where "u" and "v" are related to sizes of regions of the 3X3 array.) within the belief map.

'Claim 20 is rejected the same as claim 19. Thus, argument similar to that presented above for claim 19 is equally applicable to claim 20.

Amended Claims 19-20 state:

19. The method claimed in claim 1, wherein said belief map defines a plurality of regions having different degrees of belief and said analysis result is a signal related to the sizes of said regions within ~~the~~ said belief map.

20. The method claimed in claim 1, wherein said belief map defines a plurality of regions having different degrees of belief and said analysis result is a signal related to the locations of said regions within ~~the~~ said belief map.

Claims 19-20, as amended, track the language of Claim 1 and are supported by the application as filed, notably the original claims.

Claims 19 and 20 both require that the regions to which the signal relates, are defined by the belief map. The rejection indicates that the 3X3 array of Qian Figure 1 represents the belief map and that "u" and "v" are related to sizes of regions of the 3X3 array "within the belief map".

Qian contradicts the rejection. Qian states:

> "FIG. 1 shows a block diagram for an apparatus 100 according to an embodiment of the invention. Gradient calculator 150 receives the values of a center pixel (at location (x,y)) and its eight-neighbors." (Qian, col. 2, lines 21-22; apparatus 100 is indicated in Figure 1 by a dashed line)

This statement identifies the 3X3 array as "a center pixel (at location (x,y)) and its eight-neighbors" not the segmentation map. The center pixel (x,y) is also described:

> "As shown in FIG. 3, apparatus 100 may be used to process each among all (or substantially all) of the pixels of an input image as a center pixel." (Qian, col. 3, lines 40-42)

Based on this language, the 3X3 array shown in Qian Figure 1 represents a set of 3X3 arrays of values, each 3X3 array having a different pixel of the input image as the respective center pixel. This is not the same as the input image, since the set of 3X3 arrays has many multiples of the same pixel values. (A center pixel in one array is an eight-neighbor in many others.) Since the terms "u" and "v" are related to all of the 3X3 arrays and the arrays are centered at all or substantially all of the pixels of the input image, "u" and "v" are meaningless as to any particular sizes or locations within the belief map.

Claims 19-20 also require, in addition to the analysis result being a signal related to the sizes or locations of regions within the belief map, that the:

> "belief map defines a plurality of regions having different degrees of belief"

The terms "u" and "v" are unrelated to degrees of belief, since "u" and "v" have values of the predefined set: -1, 0, 1, for every center pixel. (Qian, Figure 3)

The rejection stated in relation to Claim 21:

'Regarding claim 21, Qian discloses the method claimed in claim 1, wherein the control signal is varied in accordance to the belief map (The control signal as shown in fig. 3, diamond label: "x=X?" is varied where x has a variable "range of x" in col. 3, line 42 in accordance to the belief map or segmentation map which is represented as as 3X3 array that is inputted into filter 100 as shown in fig.1 and fig. 3, label: "filter 100".) and a scaler derived from an analysis of the belief map (The control signal as shown in fig. 3, diamond label: "x=X?" is varied where x has a variable "range of x" in col. 3, line 42 in accordance to the belief map or segmentation map which is represented as a 3X3 array that is inputted into filter 100 as shown in fig. 1 and fig. 3, label: "filter 100" and a scaler or "X" of the "x=X?" diamond derived from an analysis of the belief map or segmentation map by "padding" in col. 3, line 46 the map "as desired" in col. 3, line 47. Thus, the segmentation of belief map can be padded in any desired fashion where the word desired is a form of an analysis.).'

Claim 21 states:

21. The method claimed in claim 1, wherein said analysis result is a scalar derived from an analysis of said belief map, said scalar being a property of said belief map.

Claim 21 is supported by the application as filed, notably the original claims and at page 16, lines 6-8.

Claim 21 requires that the analysis result is a scalar that is a property of "said belief map". This is unlike the "padding" of Qian, cited in the rejection. Such "padding" adds values to the map, hence the name "padding". The rejection notes the change in the value of "X". The changed "X" is not a property of the original belief map.

Claim 23 is supported by the application as filed, notably at page 16, lines 8-9.

Claim 26 is supported and allowable in the same manner as Claim 1.

Claim 27 is allowable as depending from Claim 26.

Claim 28 is supported and allowable in the same manner as Claim 1.

Claims 29-30 are allowable as depending from Claim 28.

Claim 33 is dependent upon Claim 31. In view of this, it is assumed that Claim 33 was misplaced and that it was intended that Claim 33 be rejected under 35 U.S.C. 103(a). Claim 33 is allowable as depending from Claim 31.

Claims 2, 4, 5-8, 17, 31 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Qian in view of Jamzadeh (US Patent 5,889,578A). Claims 2, 4, 5-8, and 17 and Claim 31 are allowable as depending from Claims 1 and 28, respectively.

Claims 9 and 18 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Maurer et al. (US Patent 6,731,821 B1). Claims 9 and 18 are allowable as depending from Claim 1.

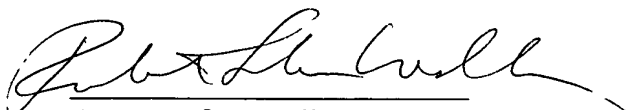
Claims 15 and 16 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Qian (US Patent 6,707,940 B1) in view of Cubillo et al. (US Patent 6,141,017A). Claims 15-16 are allowable as depending from Claim 1.

Claims 22 and 32 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Qian (US Patent 6,707,940 B1) in view of Matsugu et al. (US Patent 6,453,069 B1). Claims 22 and 32 are allowable as depending from Claims 1 and 28, respectively.

It is believed that these changes now make the claims clear and definite and, if there are any problems with these changes, Applicants' attorney would appreciate a telephone call.

In view of the foregoing, it is believed none of the references, taken singly or in combination, disclose the claimed invention. Accordingly, this application is believed to be in condition for allowance, the notice of which is respectfully requested.

Respectfully submitted,



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